HUMMINGBIRD ENRICHMENT IN BERRIES TO ENCOURAGE PREDATION OF SPOTTED WING DROSOPHILA

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An article in Good Produce, *Berry Growers Sharing Great Ideas* by Charlie O'Dell, published May 14, 2014, "Unusual Way to Control SWD" highlighted Robert Hays's, Hays Berry Farms at Dumas, MS, use of 25 hummingbird feeders per acre in his six acres of blackberries to attract hummingbirds. He estimated there are more than 500 hummingbirds flying around his fields on picking days and he had not had to spray. When feeding their young, hummingbirds will eat up to 2,000 small insects per day. The diet of an average hummingbird consists mostly of flower nectar and insects – including, but not limited to small beetles, flies, vinegar flies, gnats, mosquitoes, aphids and spiders. In Mississippi there are three species of hummingbirds, but only two are residents during summer. In NY, we have only the ruby throated hummingbird.

Berry growers in NY were interested in whether this technique could work against spotted wing Drosophila (SWD) in raspberry. Many are averse to routinely spraying insecticides or operate U-pick farms, which can make it challenging to manage SWD. Therefore, we established a field experiment to test the technique's effectiveness over four years, two years each in two one-acre fields in which raspberry breeding program selections were grown. In the final year, we recruited two growers to test its feasibility on the farm – in organic blueberry and in raspberry.

Objective 1. Deploy 25 hummingbird feeders per acre and observe associated hummingbird behavior in a raspberry planting. The one-acre plot was split between a treatment zone with feeders and a non-treatment zone without feeders. It took approximately two hour to service and clean feeders. Weekly hummingbird observations found that hummingbirds would spend seconds to several minutes and longer in the planting and at the feeders. They were seen to fly: (a) from within the raspberries to the feeder then into the raspberries; (b) from within the raspberries to the feeder then out of the field; (c) from outside the raspberries to the feeder then into the raspberries; and (d) from outside the raspberries to the feeder then out of the field. Behaviors a, b, and c were most common, indicating the birds were spending the majority of time in the raspberries.

Objective 2. Test the efficacy of hummingbird enrichment in reducing the numbers of SWD in a raspberry planting and in reducing fruit infestation. Rudimentary data analysis in the first two years had shown little to no differences in the SWD numbers or fruit infestation between the treatment zone with feeders and a non-treatment zone without feeders. Adjustments in the experimental design to address the challenges of determining the impact of a flying predator on a flying pest proved beneficial. Final design using SWD traps placed along four transects in the field, each transect containing nine traps, four traps in the feeder zone and five in the non-feeder zone gave better results. Once SWD was caught, berry samples collected along the 36 transect locations were assayed using salt flotation to determine fruit infestation levels (data not shown).

Preliminary data analysis for 2018 showed that in weeks when SWD trap catch numbers were very low (Fig. 1A) or very high (Fig. 1B), there was little to no difference in the number of SWD caught in Scentry traps placed in area of the field with hummingbird feeders compared to those in the area of the field without feeders.

However, on August 2, 2018, when numbers were moderate, a difference was found along the transect (Fig. 2A). Less SWD (40) were caught on average in the four traps in the hummingbird feeder zone compared to the average SWD (97) caught in the four traps in the no-feeder zone, a 59% reduction (Fig. 2B).

Objective 3. Explore the feasibility of this tactic in grower demonstration trials. We set up two grower demonstration plots, one in organic blueberry in Western NY and one in raspberry in Eastern NY. Both growers were meticulous about management of their plantings, using excellent sanitation, weed management, and pruning practices. The growers were able to maintain the hummingbird feeders in their plantings, indicating this practice is feasible for typical small berry plantings in NY. The organic blueberry grower had lost his entire crop in 2017 to SWD. In 2018, there was no crop loss and only one Entrust spray was applied. Whether this was directly attributable to the hummingbirds visiting the planting was not assessed.

Our results show that it is feasible for growers to deploy hummingbird feeders in berry plantings, that hummingbirds spend time in raspberries, that growers are willing to use this technique, and that enriching a fruit planting with insect predatory hummingbirds shows promise as an alternative technique to pesticides for the management of SWD.

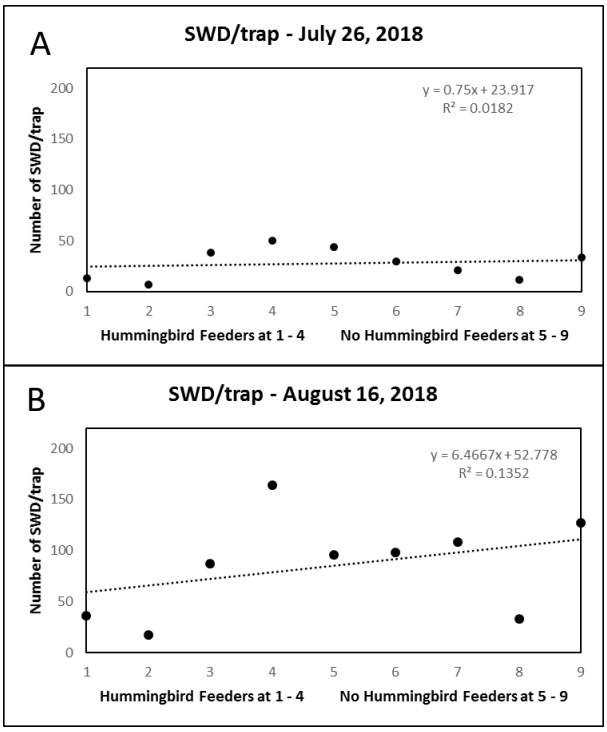

Figure 1. No trend in SWD trap catch associated with the feeder zone (1-4) when SWD catch is low (A) or high (B).

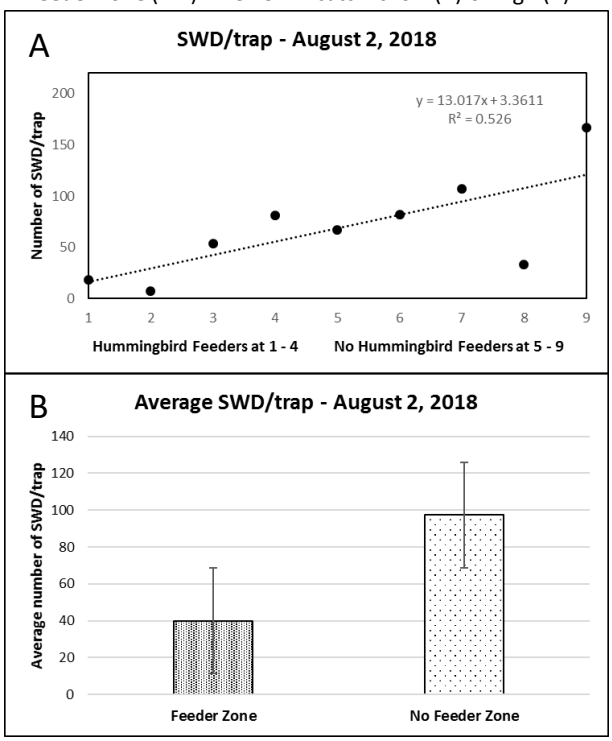

Figure 2. Fewer SWD caught in the feeder zone along the transect (A) or on average with standard error bars (B).

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